[Reprinted from St. Bartholomew's Hospital Reports, Vol. XVI.]

ANATOMICAL VARIATIONS:

AN ACCOUNT OF A FEW OF

THE MORE INTERESTING ABNORMALITIES

THAT HAVE OCCURRED IN THE DISSECTING-ROOMS
DURING THE LAST SEVEN YEARS;

WITH REMARKS ON THEIR MORPHOLOGICAL SIGNIFICANCE,

AND THEIR

BEARING ON THE PRACTICE OF SURGERY.

BY

W. J. WALSHAM.

Believing that a report of the anatomical variations that have occurred in the dissecting-rooms would be an acceptable communication to the Hospital Reports, I have selected the following from among the very numerous abnormalities that have come under my observation during the last seven years. They have been chosen either on account of their rarity, or because they seemed of morphological interest, or of some slight practical value to the surgeon. They are described from notes taken at the time. The drawings on wood were kindly made for me by Mr. Godart, from rough sketches in my note-book of the dissected parts.

No attempt is here made to furnish a statistical report of the relative frequency of the more common and everyday observed abnormalities. I hope, however, to have an opportunity of publishing such an account on some future occasion.

MUSCLES.

The right Sterno-Thyroid arising from the left as well as from the right side of the Sternum, and crossing the front of the Trachea; the left Sterno-Thyroid rudimentary.

The right sterno-thyroid, in addition to its normal origin on the right side, also arose from the back of the first bone of the sternum for three-quarters of an inch to the left of the middle line, *i.e.*, it arose from the part usually occupied by the innermost fibres of origin of the left sterno-thyroid. It measured, just

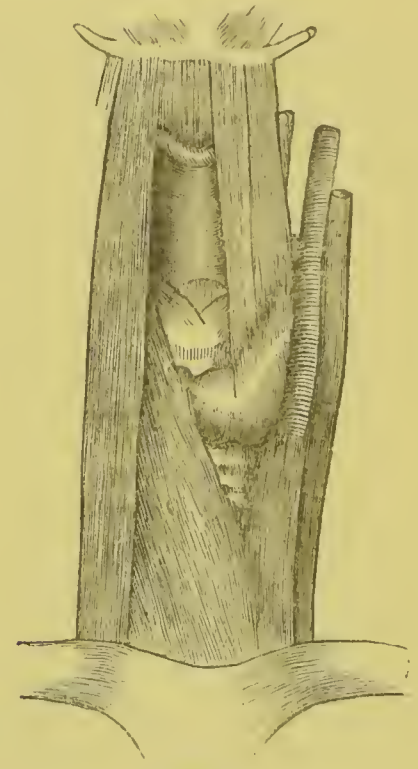

Fig. 1.

above the sternum, one and three-eighths of an inch in width. From this origin it ran obliquely across the middle line of the neck, leaving only the upper half-inch of the trachea uncovered by its fibres. It was inserted into the oblique line on the ala of the thyroid cartilage in the normal manner. A little above the sternum, at the spot where the transverse tendinous intersection is often observed, the muscle rather suddenly became narrower. No very distinct cellular interval could be traced between the part of the muscle arising from the right and the part arising from the left of the sternum.

The left sterno-thyroid was only represented at its origin and

insertion. Its middle third was quite suppressed. Its lowermost portion consisted of a few fibres, forming a thin muscle, about an inch and a half in length, and arose from the back of the sternum just external to the abnormal origin of the right muscle, and ended on the carotid sheath. Its uppermost portion, about a quarter of an inch in breadth and an inch and a half in length, was attached to the oblique line on the ala of the thyroid cartilage, and was inserted into the left lobe of the thyroid body on its antero-internal aspect. A levator glandulæ thyroideæ, arising from the body of the hyoid bone and inserted into the isthmus of the thyroid gland, was also present.

This is the only abnormality of the kind that I have seen. Macalister relates a case in which the sterno-thyroid was absent, and this Professor Humphry[1] states to be the only example of the absence of the sterno-thyroid or sterno-hyoid that he has seen recorded. A slip from the outer edge of the sterno-thyroid has been noticed, extending to the sheath of the vessels; but I know of no case in which the sterno-thyroid has been seen crossing the middle line of the neck, and in which the middle of the muscle has been suppressed. In the great ant eater the sterno-thyroids decussate across the middle line, but this decussation takes place behind the sternum, the sterno-thyroid in this animal arising in the interior of the thorax as far back as the eighth bone of the sternum (Owen); and it is noteworthy that at the place of decussation a tendinous intersection exists.

The rudimentary condition of the left sterno-thyroid is of considerable importance. In the sterno-thyroid as well as in the sterno-hyoid, a transverse tendinous intersection is often observed just above the sternum, "a remnant," says Professor Humphry,[2] "of the transverse septa of the primitive ventral muscle." Occasionally a similar but less marked intersection is seen a little higher in these muscles; whilst, as is well known, in animals with long necks, as the giraffe, the depressors of the hyoid consist of alternate tendinous and muscular portions. These tendinous intersections, which are serially homologous with the transverse inscriptions in the rectus abdominis and the rectus sternalis, when present, would thus seem to indicate that the muscle was developed from a number of distinct vertebral segments.

The explanation of the abnormality (absence of the middle portion of the left sterno-thyroid) would seem to be, that one or more of the primitive segments from which the middle part of the muscle is developed, *i.e.*, the part between two or more trans-

[1] Brit. Med. Journal, 1873, vol. i.

[2] Ibid., 1873, vol. i.

verse intersections, was non-differentiated or suppressed, or in part blended with the primitive muscular segment of the opposite side; whilst the segments above and below, *i.e.*, the portions of the muscle respectively above and below the upper and lower transverse intersections, were only to a lesser degree affected, and consequently remained in a rudimentary condition, and in the case of the lower segment, partly blended with the opposite muscle.

The knowledge of such an abnormality is not altogether without practical value; for the presence of this muscle crossing obliquely the trachea would undoubtedly be a source of embarrassment in the performance of tracheotomy below the isthmus. The whole of the trachea except the upper half-inch was completely covered by the muscle, which would have had to be divided to expose the tube, as the muscle could hardly, in this situation, have been drawn to one side.

Absence of the Anterior Belly of the Omo-Hyoid.

The anterior belly of the omo-hyoid in this body was completely wanting on the right side; on the opposite side, though present, it was smaller than usual. The posterior belly arose in the fascia over the supra-spinatus. It measured about two inches in length and a quarter of an inch in breadth; passed obliquely across the posterior triangle, and terminated under the sterno-mastoid in the cervical fascia, through a thickened band of which it was attached to the body of the hyoid bone. Similar abnormalities have been noticed by R. Quain, Hallett,[1] and others.

In the body in which this abnormality occurred the sterno-hyoid did not appear broader than natural; but this muscle was considerably broader in another body in which the anterior belly was apparently absent. The abnormal breadth of the one and the apparent absence of the other was clearly due to the blending together of the two muscles, or rather to the non-differentiation of the primitive brachio-cephalic sheet from which they are developed. Professor Turner[2] has noticed a similar condition in four cases, in all of which the inscription in the sterno-hyoid was continued into the omo-hyoid. In two of Hallett's cases of absence of the anterior belly of the omo-hyoid, the sterno-hyoid was broader than usual, and attached to the clavicle behind the sterno-mastoid—the normal origin of the omo-hyoid in some animals (menobranchus). The absence of the anterior belly is productive of considerable alteration in the

[1] Edinburgh Medical Journal, 1848, vol. ii.
[2] Edinburgh Medical and Surgical Journal, 1861.

carotid triangles, inasmuch as they would then be merged into one, and the important surgical landmark, viz., the inferior angle of the superior triangle formed opposite the cricoid cartilage by the meeting of the omo-hyoid with the sterno-mastoid, would not be present. The inferior angle of the, in this case, single triangle would be formed by the meeting of the sterno-mastoid with the sterno-hyoid at a spot considerably lower in the neck than that usually occupied by the inferior angle of the superior triangle. The inferior carotid triangle would, under these circumstances, no longer exist. This is, however, not of much practical importance, since the sterno-hyoid and sterno-thyroid are by many divided in tying the carotid at the root of the neck.

Absence of the Intermediate Tendon of the Omo-Hyoid.

The posterior belly arose naturally, passed across the posterior triangle more obliquely than usual, and was continued into the anterior belly—a tendinous intersection, but no distinct tendon,

Fig. 2.

intervening. The tendinous intersection was most marked on the outer side of the muscle and on its posterior aspect, where the tendinous fibres measured nearly half an inch in length. It was on the same level, and appeared continuous through a slight thickening of the fascia with the tendinous intersection in the sterno-hyoid. At a nearly corresponding spot in the sterno-thyroid a similar transverse intersection existed. It is interesting to note that the tendinous intersections in each of the three muscles were in the same transverse plane—an evidence that the

intersections were the remains of the same transverse septa of the primitive ventral muscle-plate, and consequently that the muscle above and below was developed from two separate vertebral segments. As the intersection in the omo-hyoid was clearly the representative of the ordinary intermediate tendon, a clue is afforded by this abnormality to the significance of two bellies in these two-bellied muscles.

In the quadrumana, with the exception of the higher tailless apes, the intermediate tendon in the omo-hyoid does not normally exist.

The Posterior Belly of the Omo-Hyoid attached to the Middle of the Clavicle.

This is a very common abnormality. According to my statistics, it occurs once in every twenty bodies; a statement, however, that must be taken with reserve, as in a few instances the condition may have been overlooked. The muscle has generally been attached for about two inches to the middle third of the posterior border of the clavicle, but I have sometimes noticed it extending for more than three inches along that border. Examples of a clavicular origin of the omo-hyoid are recorded by Mr. Wood[1] and in the Guy's[2] and St. Thomas' Hospital Reports,[3] but it does not seem to have occurred so frequently at these Hospitals as at St. Bartholomew's. In Quain[4] it is stated that when the muscle is attached to the clavicle instead of to the scapula, the posterior belly is absent. This has certainly not been my experience. When there has been no intermediate tendon, I have almost invariably found a tendinous intersection similarly placed to that in the case given above.

A clavicular attachment is the normal arrangement of the omo-hyoid in some animals, *i.e.*, the iguana. Where the muscle arises from the clavicle, a supra-clavicular or subclavian triangle no longer exists: the muscle then completely covers the third portion of the subclavian artery, and might cause some embarrassment in tying the vessel in this part of its course. I have seen a student in the operative surgery class not a little puzzled on meeting with a like arrangement.

The Omo-Hyoid arising from the Sternal End of the Clavicle.

The omo-hyoid arose by fleshy fibres from the sternal end of the clavicle. There was a slight trace of a tendinous intersection opposite that in the sterno-hyoid. Its insertion was normal.

[1] Proceedings of Royal Society, 1868.
[2] Guy's Hospital Reports, vol. xiv.
[3] St. Thomas' Hospital Reports, vol. vi.
[4] Quain's Anatomy, eighth edition.

Professor Humphry[1] mentions such an attachment of the omo-hyoid as of rare occurrence, but does not give the reference where the abnormality is recorded. The attachment is of much morphological interest, because the sternal end of the clavicle is generally regarded by anatomists as the homologue of the precoracoid; and the omo-hyoid in the batrachians, *e.g.*, the efts, arises from the precoracoid.

The Posterior Belly of the Omo-Hyoid doubled.

In this case one belly arose in the normal manner from the scapula, the other from the clavicle. Both bellies terminated in the common tendon. There was a single anterior belly. Somewhat similar instances are given in the Guy's Hospital Reports;[2] in one, "the omo-hyoid having its normal relations, an additional muscle arose from the clavicle near the sternum, and ran up to join the sterno-thyroid before its insertion;" in another, a similar slip arose from the first rib. Mr. Wood[3] has recorded a case of a double omo-hyoid, the upper one digastric, the lower interrupted by tendon, and attached to the base of the coracoid process.[4]

Tendinous Intersection in the Posterior Belly of the Digastricus.

The tendinous intersection was situated about half an inch

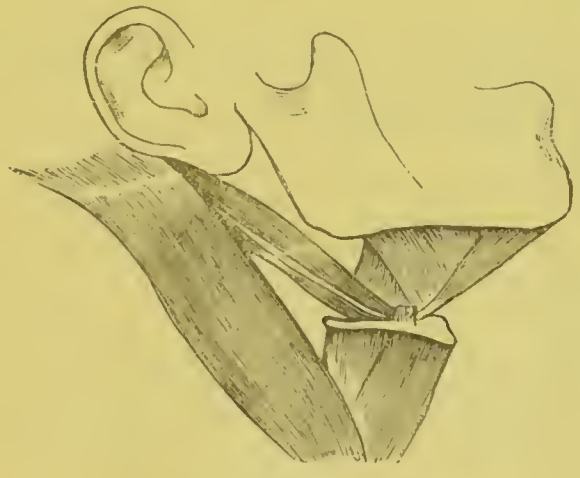

Fig. 3.

from the normal tendon. It involved the whole of the fibres,

[1] Observations on Myology, Brit. Med. Jour., vol. ii. 1873.
[2] Vol. xiv. p. 438. [3] Proceedings of Royal Society, 1867.
[4] Since this was written I have seen two examples similar to the first mentioned in the Guy's Reports, and one like that of Mr. Wood's.

and extended through the muscle downwards and forwards obliquely to the long axis of the muscle, but transversely to the long axis of the neck. This abnormality appears to be a minor grade of the following:—

A distinct Tendon in the Posterior Belly of the Digastricus.

The posterior belly of the digastricus was divided into two distinct muscles by a tendon half an inch long, situated about

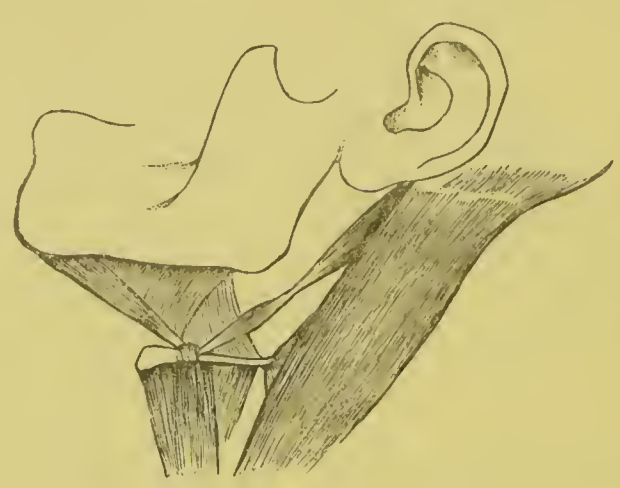

Fig. 4.

half an inch from the normal tendon. On the opposite side of the neck the digastricus presented a tendinous intersection similar to that in the preceding case.

These abnormalities appear to be rare. They are the only cases I have seen during my connection with the dissecting-rooms, nor have I found the abnormality mentioned elsewhere.

The anterior belly of this muscle is very frequently abnormal, but my experience agrees with Professor Humphry's that the "hinder belly varies little or seldom." I have many times seen the anterior belly double and decussating across the median line —the normal arrangement, as pointed out by Mr. Wood, in the Norway rat, and to a lesser degree in ruminants. Three bellies have been observed by Hallett, about once, he says, in every fifteen subjects, "The third belly commenced by a short flattened tendon at the anterior part of the reflection between the two normal bellies; a branch of the mylo-hyoidean nerve could be traced into the third belly."[1] These were evidently examples of a double anterior belly. Neither the anterior nor the posterior

[1] Loc. cit., p. 12.

belly has been observed absent—an experience, as far as the anterior belly is concerned, in accordance with that of Professor Humphry, who remarks that "variations in the anterior belly are on the side of excess rather than of deficiency."

In birds and reptiles, the muscle that is supposed by many to be the homologue of the digastricus in man has only one belly, and descends from the hinder part of the cranium to the posterior end of the mandible; but in some birds it is divided into three portions (Mivart). The three portions of muscle in the abnormality under consideration is suggestive of a reversion to the aval type. In the carnivora, moreover, the "digastricus," although apparently single bellied, has many tendinous filaments in the middle of the muscle substance.

Professor Humphry[1] is of opinion that the hinder belly of the digastricus and the stylo-hyoid are developed from the deeper stratum of the brachio-cephalic extension which reaches forwards from the sternum to the skull. "These two muscles," he says, "are evidently two segments of an anterior part of that muscle, and they are marked off from the post-hyoidean portion (sterno-hyoid) of the stratum by the hyoid bone and the other remnants of the transverse intermuscular hyoidean septum; just as the anterior belly of the digastricus is a segment of the superficial stratum, and terminates posteriorly in the same septum, which thus forms the uniting tendon between the two bellies." The tendinous intersection or distinct tendon in the posterior belly of the digastricus appears to me also to be a remnant of a primitive transverse septum, and consequently to point to the development of the posterior belly of the digastricus from two distinct vertebral segments. This view seems borne out by the following muscular variation:—

A thin Slip of Muscle arising from the Digastric Fossa of the Temporal Bone and inserted into the Hyoid Bone near the Lesser Cornu.

This very interesting abnormality occurred in the same body as that in which the tendon was observed in the posterior belly of the digastricus (see fig. 3), but on the opposite side; that is, on the side on which the posterior belly presented merely a tendinous intersection. The slip in question ran parallel to, and a little below and to the other side of, the posterior belly of the digastricus. It arose from the digastric fossa and terminated in a small slim tendon, by which it was inserted into the body of

[1] Loc. cit., vol. i. 1873, p. 695.

the hyoid bone near the lesser cornu. The fleshy fibres measured about two inches in length and about an eighth of an inch in thickness, and were divided into an upper and lower portion by a delicate tendon. This tendon was in the same transverse plane as the tendinous intersection in the posterior belly of the digastricus, and must evidently have had its origin in the same way as the intersection in the digastricus. I know of no similar condition having been observed.

Variations in the Stylo-Hyoid.

A second stylo-hyoid arose from the base of the styloid process and accompanied the stylo-hyoid ligament to the hyoid bone. The normal stylo-hyoid did not embrace the digastricus. Two similar cases were noticed at Guy's Hospital.[1] The variation has also been seen by Lawson Tait[2] and others. In an instance mentioned by Mr. Wood in which the muscle was double, one part was attached to the posterior belly of the digastricus, the other to the anterior belly.[3]

The stylo-hyoid has occasionally been absent or blended with the digastricus, and marked variations in the size of the muscle have frequently been observed; but one of the most interesting varieties is that first described by Mr. Wood, in which the muscle was continuous with the omo-hyoid, thus approaching the form that it takes in the great ant eater. The muscle has also been observed proceeding from the styloid process along the stylo-maxillary ligament to the angle of the jaw, the normal attachment in some birds, *e.g.*, the fieldfare (Mivart).

Mr. Perrin,[4] however, has pointed out the resemblance which the stylo-hyoid in birds bears to the muscular slips (occipito-hyoids) described by him in the "Journal of Anatomy and Physiology." The stylo-hyoid, however, was normal in two of the bodies in which these muscular slips were observed, although it was absent in a third.

Dr. Shepherd records an interesting specimen in which the muscle ran beneath the external carotid artery, but, as he says himself, this might more properly be regarded as an abnormality in the course of the artery. It is one not so very uncommon.[5]

Presence of a Mylo-Glossus.

The muscle arose from the angle of the lower jaw and the

[1] Guy's Hospital Reports, vol. xvi.
[2] Journal of Anatomy and Physiology, May 1870.
[3] Proceedings of the Royal Society, 1868.
[4] Journal of Anatomy and Physiology, vol. v.
[5] Montreal General Hospital Reports, vol. i. 1880.

stylo-maxillary ligament, and was inserted into the side of the tongue, blending with the fibres of the stylo-glossus.

This muscle was first described by Mr. John Wood.[1] In his case, however, the muscle was not attached to the stylo-maxillary ligament.

A Double Stylo-Pharyngeus.

The second portion of the muscle was represented by a thin slip passing from the styloid process along the lower border of the normal muscle to the walls of the pharynx. The glosso-pharyngeal nerve passed between the two portions of the muscle. A second stylo-pharyngeus is recorded in the "Guy's Hospital Reports," vol. xviii., passing behind the middle constrictor of the pharynx. A similar case has been observed by Mr. Wood.

The Middle Portion of the Hyo-Glossus absent.

Several examples of this variation have been observed. The portion of the muscle absent was that which arises from the

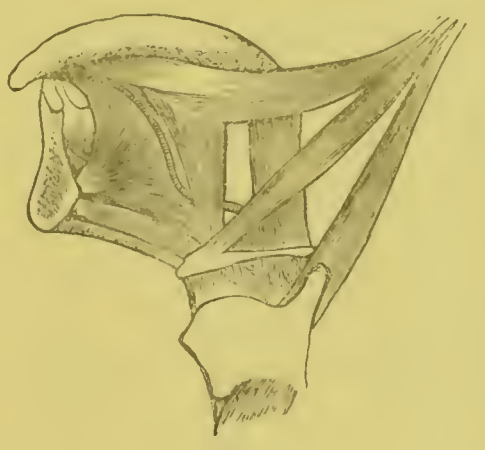

Fig. 5.

lesser cornu, so that an interval was left between the portions arising from the body and from the greater cornu. The fact that each part of the muscle constitutes a separate muscle in some of the lower animals, offers a ready explanation of the deficiency. On account of its frequency this abnormality is perhaps not altogether devoid of practical importance, as when it occurs the lingual artery, where it lies in the triangle formed by the two bellies of the digastricus and the hypo-glossal nerve, is then uncovered by muscle; a point worth remembering should one be

[1] Proceedings of the Royal Society, 1868.

called upon to perform what may be called the dissecting-room operation of tying the lingual where it lies between the hyo-glossus and the middle constrictor of the pharynx.

Presence of a Triticeo-Glossus.

The triticeo-glossus has been frequently observed arising from the cartilago-triticea, a small nodule of cartilage generally but not always present in the posterior thyro-hyoid ligament. The muscle has been noticed even when no trace of the cartilage could be found. Under these circumstances the muscle is either attached to the thyro-hyoid ligament or to the top of the superior cornu of the thyroid cartilage.

The Subclavius inserted into the Coracoid Process as well as into the Clavicle.

The subclavius, in addition to its attachment to the clavicle, was inserted by a slip derived from its posterior part into the coracoid process at the attachment of the conoid ligament. A few fibres were attached to that ligament. Similar examples are mentioned in the "Guy's Hospital Reports"[1] and by Mr. Wood.[2]

That part of the subclavius muscle which ran from the clavicle to the base of the coracoid process appears to be similar to that described by Mr. Wood as the scapulo-clavicular muscle, which he points out is clearly the homologue of the scapulo-clavien of Cuvier and Laurillard, described and figured by them as occurring in the rat-mole of the Cape and didelphys marsupialis, and which Mr. Wood has also found well marked and distinct in the Norway rat, the guinea-pig, and, in a less distinct form, in the rabbit.

In Mr. Wood's case, the slip, which measured nearly an inch in width, arose from the base of the coracoid process, and was inserted into the clavicle with the outermost fibres of the subclavius muscle. A slip of muscle, likewise noted by the same author, has been seen arising from the cartilage of the first rib and inserted into the base of the coracoid, but not attached to the clavicle in any part of its course. This slip reminds us of the arrangement in the monotremata, in which the normal attachment of the subclavius is into the coracoid (Owen). The coracoid in these animals, however, is not a subordinate process of the scapula.

In a second case of double subclavius muscle observed at St. Bartholomew's Hospital, a bursa existed between the tendon in which the muscle ended and the coracoid process, and an expan-

[1] Vols. xiv. and xviii.

[2] Proceedings of Royal Society, June 16, 1864.

sion could be traced from this tendon to the humerus. In birds the subclavius arises under the pectoralis and its tendon passes between the clavicle, the coracoid, and the scapula, to be inserted into the humerus (Mivart). The bursa over the coracoid and the expansion to the humerus reminds us of the arrangement of the subclavius in birds.

By Professor Humphry, however, the pectoralis minor is regarded as the homologue of the subclavius or levator humeri of birds; but the pectoralis minor, as pointed out by this author, is continuous with the subclavius in some animals, as the two-toed anteater, though separated from it in man by the costo-clavicular fascia.

In connection with these abnormalities of the subclavius may be mentioned the following interesting variations, of which three examples have been observed :—

The Pectoralis Minor inserted into the Humerus.

The muscle ended in a tendon which passed over the coracoid process, a bursa intervening between it and the bone, and was inserted into the capsule of the shoulder-joint, and through it into the greater tuberosity of the humerus.

This is the normal arrangement in some of the quadrumana, and resembles, as above stated, the method of insertion of the subclavius or levator humeri of birds, with which it is by many regarded as the homologue. Professor Mivart, however, is of opinion that the pectoralis minor in birds is blended with the pectoralis major.

The Anterior Fibres of the Trapezius extending across the lower part of the Posterior Triangle in the form of an arch.

The trapezius had its normal origin. The anterior fibres extended over the greater part of the lower half of the posterior triangle to within two inches of the sternal end of the clavicle. The most anterior of these fibres terminated directly on the posterior border of the clavicle under cover of the sterno-mastoid, the insertion measuring about half an inch. The next set of fibres terminated on a tendon which stretched in the form of an arch, with the concavity towards the clavicle, from the acromion, just external to the clavicular articulation, to the clavicle external to the insertion of the most anterior fibres of the slip. About an inch from the clavicle this tendon spread out into an aponeurosis, which became attached to half an inch of the posterior border of that bone.

In two somewhat similar cases the anterior fibres with the arched tendon did not quite reach the sterno-mastoid, but were inserted into a prominent tubercle on the posterior border of the

Fig. 6.

clavicle just external to that muscle. In these instances the external jugular vein passed between the tendon and the clavicle. In all the cases the slip from the trapezius was situated immediately in front of the third part of the subclavian artery, an interval of less than a quarter of an inch only existing between the tendon and the clavicle.

Similar abnormalities of this muscle are described by Wood,[1] Macwhinnie,[2] Grüber,[3] Hallet,[4] Macalister,[5] and by the demonstrators of Guy's Hospital in their Reports.[6]

The comparative frequency of its occurrence forbids us from leaving it altogether out of consideration in the operation of tying the subclavian artery in the third part of its course.

By Mr. Wood this variation is believed to be due to a blend-

[1] Proceedings of Royal Society, 1866 and 1867.
[2] London Medical Gazette, 1846, p. 194.
[3] Vier Abhandlungen, 1847, S. 16.
[4] Edinburgh Medical and Surgical Journal, 1848.
[5] Proceedings of Royal Irish Academy, 1866.
[6] Guy's Hospital Reports, vol. xiv.

ing or fusion of the cleido-occipital or cephalo-humeral with the cervical border of the trapezius. It may be regarded as homologous with the masto-humeralis of the claviculate ungulates, the deeper portion of which is inserted as far forward as the sternum. The masto-humeralis, however, is looked upon by Professor Owen as the homologue merely of the cleidal portion of the trapezius.

The Trapezius consisting of two separate muscular portions.

The aponeurosis between the upper and lower fibres of the trapezius extended to the scapula, dividing the muscle into two distinct parts. This is the normal condition of the muscle in some animals. Thus, in the monotremata [1] the anterior or upper part arises from the occipital bone and tendinous raphé connecting it with its fellow of the opposite side, and is inserted in the outer half of the spine of the scapula; whilst the posterior or lower part, triangular in shape, arises from the tenth and eleventh dorsal vertebræ, and is inserted by a strong tendon behind the extremity of the spine of the scapula. In the quagga and mule it also normally consists of two portions, whilst in the horse and ox only the scapular part of the muscle of man is represented.

A Muscular Slip extending from the Sternal End of the Clavicle to the Transverse Process of the Atlas.

The slip measured about a half an inch in width. It arose from the posterior border of the clavicle, just external to the origin of the sterno-mastoid, and crossing superficially to the omo-hyoid and the posterior triangle of the neck, was inserted into the transverse process of the atlas in front of the attachment of the first slip of the levator anguli scapulæ. I am not aware that this variation has been elsewhere described.

A Slip extending from the Mastoid Process to the Carotid Sheath opposite the Thyroid Cartilage.

This slip, which was about a quarter of an inch in width, arose by a tendon about an inch and a half long from the apex of the mastoid process of the temporal bone, and stretching along and under cover of the anterior margin of the sterno-mastoid muscle, was inserted aponeurotically into the carotid sheath opposite the lower margin of the thyroid cartilage.

[1] Owen's Anatomy of Vertebrates, vol. iii. p. 3, 1868.

Muscular Slips from the Latissimus Dorsi crossing the Axilla.

Slips and expansions from the axillary border of the latissimus dorsi have been very frequently observed. They were attached as follows:—

To the pectoralis major, the pectoralis minor, the coracobrachialis, the teres major, the coracoid process, the axillary fascia, and the fascia of the arm. The embarrassment to which they might give rise in tying the axillary artery in the third part of its course is obvious. Each of these attachments is the normal arrangement of the muscle in some one of the lower animals. Thus in the monotremata the latissimus dorsi is inserted into the fascia of the arm and forearm, as well as into the humerus. In perameles it is connected by a slip to the teres major, and in the lepidosiren it is connected to the pectoralis major, &c.

Presence of a Flexor Indicis.

The muscle abnormally present consisted of a fleshy slip about the size of the extensor indicis. It arose from the anterior surface of the interosseous membrane immediately above the pronator quadratus, and was separated from the flexor profundus by a distinct cellular interval. It was inserted into the base of the third phalanx of the index-finger. A distinct flexor indicis is the normal condition in the orang-outang, gorilla, and chimpanzee.

In a second case a slip of muscle, of about the same dimensions as the above described, arose from two or three inches of the interosseous membrane, just above the pronator quadratus, and from the contiguous anterior surface of the radius internal to the flexor longus pollicis. It ran under the annular ligament, between the flexor sublimis and flexor profundus digitorum, and was inserted into the deep flexor tendon of the index-finger, opposite the middle of the metacarpal bone. In two similar abnormalities observed by Mr. Wood, the flexor pollicis divided into two, but the inner and smaller portion joined the indicial tendon of the flexor profundus about the wrist; and in another case it was inserted directly into the ungual phalanx. This author has also seen a slip of muscle which may be compared to the communicating tendon between the flexor longus pollicis and the flexor longus digitorum of the foot, passing in the opposite direction, *i.e.*, from the flexor digitorum to the flexor pollicis, a variation which I have observed occasionally in the human foot, and which is normal in the gorilla and chimpanzee.[1]

[1] Wilder, Boston Journal of Natural History, vol. vii. p. 364.

The Flexor Profundus Digitorum inseparably united with the Flexor Longus Pollicis.

There was no cellular interval between these muscles. The anterior interosseous artery was completely covered by the fibres of the united muscles arising over it from the interosseous membrane. The muscle split primarily into two tendons—the outer one was inserted into the thumb as the flexor pollicis, the inner divided into four tendons for the fingers. Non-differentiation of the deep muscle on the flexor aspect of the arm into the flexor pollicis and digitorum is a common condition in the lower animals, as, *e.g.*, in echidna and dasypus. Slighter grades of union of the flexor profundus and flexor longus pollicis by slips, both muscular and tendinous, passing in various ways from the one to the other, as might be expected from the many varieties of this muscle present in animals, have been very frequently observed, and somewhat similar slips have been recorded by others.

A Slip from the Pronator Quadratus to the Scaphoid Bone.

The slip ran obliquely downwards and outwards through a slight groove in the lower end of the radius, and was inserted

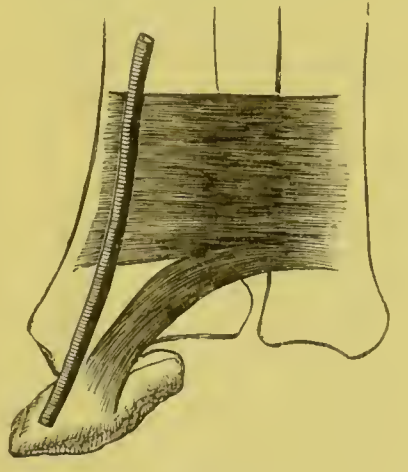

Fig. 7.

into the tubercle of the scaphoid. It measured two and a half inches in length and a quarter of an inch in breadth. It was fleshy both at its origin and insertion. The tendon of the flexor longus pollicis crossed it, and the radial artery was to its outer side. A similar slip prolonged from the muscle to the radial

side of the carpus has been observed by Macalister,[1] and one prolonged to the carpus on the ulnar side by Grüber.[2]

The Extensor Indicis arising from the Dorsum of the Wrist.

The muscle was about the size of a lumbricalis. It arose from the dorsal ligament of the wrist at the bottom of the groove common to the tendons of the extensor communis digitorum and extensor indicis, and ended on a tendon which joined the extensor communis on the metacarpal phalanx in the usual manner. A similar slip arising from the dorsal ligament of the carpus, and inserted by two tendons, one joining the common extensor tendon of the index-finger, the other that of the middle finger, has been twice observed at Guy's Hospital.[3]

An extensor proprius digiti medii has been observed by Wood,[4] and by the demonstrators of St. Thomas' Hospital,[5] arising from the lower end of the back of the ulna and interosseous ligament, distinct from the indicator muscle, and inserted into the dorsal expansion of the common extensor tendon.

The extensor indicis in the lemuridæ gives tendons to the third, fourth, and fifth digits as well as the index. In the dog and rabbit the extensor indicis coalesces with the extensor secundi internodii pollicis.

The origin of the extensor indicis from the dorsum of the wrist, especially when its attachments can be traced to the cuneiform bone, which is the homologue of part of the os calcis in the foot, is of interest as further pointing to the homology of this muscle to part of the extensor brevis digitorum pedis. It would at first appear as if there was no muscle in the upper extremity homologous to the extensor brevis digitorum in the lower. The indicator, the extensor primi internodii pollicis, and the extensor minimi digiti, however, may be together taken as representing it; but with this difference, that the parts composing it have undergone further differentiation and modification to meet the higher functional development of the hand; and have, moreover, for better leverage, become attached to the bones of the arm instead of to the carpus. The occasional attachment of the indicator to the bones of the carpus and the presence of an extensor medii digiti seems to lend support to this view, which, if correct, would allow us to regard the attachment of

[1] Jour. Anat, Physiol., vol. v.
[2] Grüber, Mém. St. Petersburg Academy.
[3] Reports, vol. xvi. p. 152; vol. xiv. p. 442.
[4] Proceedings of Royal Society, 1865.
[5] St. Thomas' Hospital Reports, vol. vi.

the indicator to the carpus as a reversion to a lower grade of development.

A Third Head to the Gastrocnemius.

The outer and inner heads of the gastrocnemius were attached in a normal manner to the femur; a third head, about the size of the plantaris (3 inches in length and $\frac{1}{2}$ an inch in width),

Fig. 8.

was situated internal to the inner head, and was quite distinct from it. It arose from the back of the internal condyle, $1\frac{1}{2}$ inch above the inter-condyloid notch, internal to the axis of the femur. The fleshy fibres ended on a rounded tendon one inch above the point of convergence of the outer and inner heads of the gastrocnemius, and could be traced, after meeting the two heads, as a flattened tendon, to the middle of the gastrocnemius.

The accessory head was quite distinct from the plantaris, and about one inch from it. The popliteal artery ran between it and the internal head. This abnormality has only once been observed by the demonstrators of Guy's.[1] A third head has been observed by R. Quain[2] to pass between the popliteal artery

[1] Guy's Hospital Reports, vol. xvi.
[2] R. Quain, plate 80, figs. 4 and 5.

and vein. In "St. Thomas Hospital Reports"[1] a similar muscle has been described, arising from the inner condyle, and enclosing the popliteal artery and vein in a kind of muscular tube, and blending with the outer head of the gastrocnemius.

Mr. Wood[2] met with a similar slip arising by two heads, one from the middle portion of the popliteal surface of the femur just above the condyles; the other from the posterior ligament of Winslow close to the plantaris muscle. This second slip was tendinous at its origin, and joined the outer side of the muscular slip opposite the knee-joint. This muscle, however, did not end in a tendon, but increasing slightly in size, joined the inner head of the gastrocnemius just before its union with the outer head.

Henle[3] also describes a third head ending in a round tendon, which spread out and joined the gastrocnemius and soleus at their point of union.

During the last year an instance has been recorded by Dr. Shepherd[4] of the absence of an external head. The abnormality occurred in a female subject. On removing the skin and the fascia the plantaris appeared. There was no trace of an external head.

Arteries.

Variations in the origin, course, and distribution of the arteries have been very frequent. The arteries which have been most subject to such variations are the external circumflex in the leg, the thyroid axis, the thoracic axis and other branches of the axillary, and the branches of the brachial.

The Right Subclavian arising from the Third Part of the Arch of the Aorta.

The right subclavian arose from the back and lower part of the third portion of the arch of the aorta. It ascended upwards and to the right, crossing the spine on a level with the sixth cervical vertebra behind the œsophagus and the trachea to the inner border of the first rib on the right side. The vertebral, internal mammary, thyroid axis, and superior intercostal were given off from it normally. The right carotid arose directly from the transverse part of the arch of the aorta, taking the place usually occupied by the innominate. The left carotid and

[1] St. Thomas' Hospital Reports, vol. vi., 1875.
[2] Wood, Proceedings of Royal Society, 1868.
[3] Henle, Handbuch der systematischen Anatomie des Menschen, vol. i.
[4] Montreal General Hospital Reports, vol. i., 1880.

left subclavian had normal origins. The left vertebral, smaller than usual, arose normally from the left subclavian. The left recurrent laryngeal coiled round the aorta as usual, and then ran in front of the right subclavian to the larynx in the interval between the œsophagus and the trachea. The left recurrent laryngeal came off straight from the pneumogastric, and ran direct to the larynx without coiling round the subclavian. One or two separate branches were given off directly from the pneumogastric to the trachea and œsophagus. The pneumogastric crossed in front of the right subclavian, the sympathetic behind. I have only once observed this abnormality, which is of considerable interest, part of the right subclavian being here supposed to represent the right posterior aortic root which has remained unobliterated, an explanation so well known that I need not further refer to it. The height that the right subclavian ascended into the neck, crossing the spine at the level of the sixth cervical vertebra, would have rendered it liable to have been wounded in the operations of œsophagotomy and extirpation of the pharynx—a consideration, however, of but little practical importance, seeing that such operations are rarely called for, and that the abnormality itself is rare.

A very interesting specimen bearing on this abnormality has recently been recorded by Dr. Shepherd of Montreal.[1] In it "an aberrant vessel was given off from the thoracic aorta opposite the fifth dorsal vertebra, and from here proceeded upwards and towards the right side, passing over the œsophagus behind the ascending arch of the aorta to the right bronchus, where it gave off two small branches to the bronchial glands. It then continued upwards in a tortuous course to the right side of the trachea, and ended by joining the subclavian in the second part of its course. The branches of the aorta were normal." Dr. Shepherd regards this vessel, which was about the size of a goose-quill, as the persistent posterior right aortic root; it differs from all other known examples of persistence of this root in that atrophy of the fourth right aortic arch had not taken place.

The Lachrymal a Branch of the Middle Meningeal.

The lachrymal artery was given off from the trunk of the middle meningeal, and passed through a small foramen external to the sphenoidal fissure into the orbit, where it was distributed in the normal manner. It was connected by a few small twigs with the ophthalmic artery. The lachrymal and middle men-

[1] Montreal General Hospital Reports, vol. i., 1880.

ingeal arteries always anastomose by small branches running through the outer angle of the sphenoidal fissure, or through a foramen just external to that fissure. The distribution of the artery here described is probably due to an enlargement of one of those anastomosing vessels. A similar abnormality is noticed in "Guy's Hospital Reports," vol. xiv.

A large Branch from the Superior Thyroid crossing the Trachea between the Cricoid Cartilage and the Isthmus of the Thyroid Body.

The branch in question was the size of the radial. It came off from the superior thyroid where this vessel comes into contact with the lobe of the thyroid body. It crossed the trachea obliquely, and anastomosed with the superior and inferior thyroid arteries of the opposite side. I have seen three similar examples in the dissecting-room, and another in performing the operation of tracheotomy. In the last instance the artery crossed the trachea immediately below the cricoid cartilage, and was divided whilst finally clearing the trachea. It bled very freely until it was secured, and would no doubt have been serious had it been wounded whilst incising the trachea. Such a distribution is not so very uncommon, and I refer to these five cases merely to emphasise the importance of fully exposing and thoroughly clearing the trachea before opening it.

The Right Bronchial derived from the Subclavian.

This branch came off from the first part of the right subclavian artery, and ran a little to the right of the trachea to the back of the root of the right lung, where it turned outwards, and tracking along the right bronchus, was distributed in the usual way. The artery was about the size of a small crow-quill.

I am not aware that this abnormality has been previously recorded, although a very similar one, viz., the bronchial arteries arising by a common trunk from the subclavian, has been noticed by Haller. The bronchial arteries have also been seen descending into the thorax from the superior intercostal, internal mammary, and inferior thyroid arteries.

A large Branch of the Internal Mammary running vertically behind the Ribs near their Angles.

This branch, when injected the size of a crow-quill, came off from the left internal mammary about two inches from the origin of the latter from the subclavian, and after passing obliquely

outwards in the second left intercostal space, turned vertically downwards, and ran behind the intercostal spaces and ribs a little anteriorly to their angles, and ended below the fourth space in one of the anterior intercostals. It anastomosed by small lateral offsets with the intercostal vessels as it crossed them. The liability of such an abnormal artery to injury in the operation of tapping the chest is obvious.

The Anterior Circumflex, the Posterior Circumflex, the Subscapular, the Superior Profunda, and the Inferior Profunda arising from the Axillary by a Common Trunk.

In the arm, the following is by far the most frequent variation of the arteries that I have observed.

The trunk common to the above-mentioned vessels generally arises from the anterior and outer side of the axillary just below the insertion of the subscapularis. After a course of a quarter to half an inch it gives off the subscapular artery, which usually crosses over the axillary and courses along the lower border of the subscapularis, giving off the dorsalis scapulæ in the usual situation. After another quarter of an inch to an inch, the anterior and posterior circumflex come off together from the common trunk. The posterior circumflex passes under the teres major and latissimus dorsi to reach the deltoid. After another half inch to an inch and a half, the trunk generally divides into the superior and inferior profunda, the superior profunda passing to the outer side of the brachial to gain its normal position between the two heads of the triceps, the inferior profunda crossing over the brachial to join the ulnar nerve about the lower third of the arm.

A large Branch from the Brachial Artery distributed as the Ulnar in the Palm; the Ulnar in the Forearm derived from the Brachial as usual.

An account of this abnormality was published in the "Journal of Anatomy and Physiology"[1] by Mr. W. S. Richmond, who dissected the part.

"The brachial artery gave off a little higher than its middle a large branch which pierced the brachial aponeurosis, and ran superficially along the inner side of the upper and fore arms to the palm of the hand. It lay in its entire course in the superficial fascia, and gave off no branch before reaching the palm. It passed over the annular ligament on the outer side of the pisi-

[1] Vol. xiv.

form bone, and entered beneath the palmar fascia where it terminated by dividing into a superficial and a deep branch, the former of which formed the superficialis volæ branch of the radial, and formed the superficial arch, whilst the latter represented the profunda ulnaris and joined the deep arch. . . . The brachial artery divided in the usual way in the triangular space at the bend of the elbow." One branch formed the radial, the other was distributed as the ulnar, but only to the forearm.

The Deep Epigastric given off by the Obturator.

The deep epigastric on the right side was given off from the obturator just where the latter vessel passes through the obturator foramen. It coursed round the inner side of the femoral ring, then between the peritoneum and the fascia transversalis to the sheath of the rectus. There was no trace of any anastomosis between this vessel and any branch of the external iliac. It gave off the pubic branch. The cremasteric was very small, and was given off direct from the external iliac. The artery was not abnormal on the left side. It is exceedingly common to find the obturator arising from the epigastric, but not so the epigastric from the obturator. Two similar examples, however, have been recorded by Monro and Hesselbach.[1]

An Accessory Pudic Artery crossing the Middle Line of the Body immediately above and in front of the Prostate.

The accessory pudic in this instance arose from the trunk of the internal iliac just before its bifurcation, and coursed along the side of the bladder and prostate external to the capsule of the latter. At the side of the prostate, just behind the posterior layer of the triangular ligament, it divided into two branches; one branch pierced the posterior layer of the triangular ligament and broke up between the two layers into the artery of the bulb, the artery of the crus, and the dorsal artery of the penis. The other branch crossed the middle line of the body, immediately above and in front of the prostate, and then piercing the posterior layer of the triangular ligament on the right side of the body, gave off between the two layers of that ligament the *anterior* artery of the bulb, the *anterior* artery of the crus, and the dorsal artery of the penis. One inch and a half from its origin the accessory pudic gave off a middle hæmorrhoidal branch about four inches in length, which ran by the side of the rectum to within one inch of the anus, where it was distributed to the

[1] Morbid Anatomy of the Human Gullet (Monro). Die Sicherste Art des Bruchschnittes (Hesselbach).

walls of the bowel. On the left side the regular pudic was very small, but had a normal distribution supplementing the blood supply of the accessory. On the right side the regular pudic artery ended in the bulb.

An accessory pudic artery is not uncommon I have frequently seen it in the dissecting-rooms during the last seven years, and its course is generally described in the text-books on anatomy. But an accessory pudic crossing the middle line of the body is rare. Only one other instance of it has occurred within my experience.

There are many points of interest connected with this occasional occurrence of a pudic accessory, especially with regard to the lateral operation of lithotomy. There is not, as a rule, much danger of wounding the vessel, if the capsule of the prostate is not divided with the knife, as in all the examples that have occurred in our rooms the vessel was external to the capsule; and as far as I can gather this has been the experience of others. I have also found that when the accessory artery gives off the artery of the bulb, this latter branch is always higher than usual, and so, if anything, is less likely to be cut in the lateral operation than when it is derived in the ordinary way. The possible existence of a branch of the accessory pudic crossing the median line immediately above the prostate should not be lost sight of in the performance of the operation, recently proposed by Mr. Furneaux Jordan, of incising the prostate and the neck of the bladder in an upward direction. Such an incision in either of the bodies in which this abnormality has been observed must, I think, have led to a wounding of the vessel in question, and to considerable hæmorrhage, which, from the size and situation of the vessel, would have been serious and difficult to control.

Veins.

A Left Superior Vena Cava.

Three specimens of this interesting condition of the veins of the heart have come under notice during my connection with the anatomy-rooms. Two of them were exhibited by Mr. Furner at the Abernethian Society, and are briefly described by him in the Hospital Reports.[1] The present example was shown by me at the Pathological Society, and a short description is published in the Society's Transactions. As I was fortunate enough to see the abnormality before the relation of the parts had been disturbed or any of the communicating veins cut away, and consequently obtained the heart and the vessels in a perfect

[1] St. Bartholomew's Hospital Reports, vol. x., 1874.

state, it seems worth while to publish a detailed account of it. It occurred in an adult male. The heart was about the normal size. The right vena cava was smaller than natural, but pursued its accustomed course to the right auricle. On the left side the internal jugular and subclavian veins united to form not the normal left innominate vein, but a large vein, the so-called persistent left vena cava, which entered directly into the right auricle. In place of the left innominate vein a small transverse branch stretched across and in front of the great vessels at the root of the neck and united the two venæ cavæ. The persistent left vena cava passed downwards and in front of the arch of the aorta and root of the left lung, and piercing the fibrous layer of the pericardium on a level with the upper border of the right branch of the pulmonary artery, crossed the pulmonary vessels and reached the side of the left auricle immediately behind the appendix, and then turning backwards under the left lowermost pulmonary vein, ran obliquely in close contact with the left auricle, following the course of the auriculo-ventricular groove, and opened by a wide orifice into the right auricle a little behind and to the left side of the opening of the inferior vena cava; that is, in the normal situation of the opening of the coronary sinus. From the junction of the left internal jugular and subclavian veins to its termination in the right auricle the vein measured eight inches; from the aforesaid junction to the transverse branch, seven-eighths of an inch; from the transverse branch to the reflexion of the pericardium, two and a half inches. The portion of the vein outside the pericardium was smaller than the corresponding part of the right vena cava, the left measuring immediately below the transverse branch one inch and three-eighths in circumference, and immediately before it entered the pericardium one inch and a half, the right measuring in corresponding situations one inch and a half and one inch and five-eighths. The portion of the left vena cava outside the pericardium rested on the left carotid and left subclavian arteries and arch of the aorta; it had the phrenic nerve coursing along its left side, and it was in close relation with the left pleura. The portion inside the pericardium, as has been found in other cases, became very much dilated, measuring as much as two inches and five-eighths in circumference. As it passed from the left pulmonary artery to the root of the subjacent pulmonary vein, it was contained, as in Mr. Marshall's case, and to use his own words, in a tube-like fold of the serous membrane, the analogue of the vestigial fold. In the remainder of its course it was bound down by the serous layer of the pericardium. The opening of the left superior vena cava into the right auricle measured

seven-eighths of an inch in diameter; the opening of the right cava half an inch. The opening into the auricle was surrounded for a third of its circumference posteriorly and internally by a slight ridge continuous with the lower costa of the annulus ovalis in front, and terminating in a second ridge which partly surrounded the opening of the inferior vena cava, and to which the Eustachian valve was attached. There was no Thebesian valve guarding the orifice of the left cava, but a slight fold of the lining membrane occupied the usual situation of the valve.

The left vena cava, above the transverse branch connecting it with the right vena cava, received the left vertebral, the left internal mammary, and the deep cervical veins, all of which were guarded by semilunar valves. Three-eighths of an inch above the reflexion of the pericardium the left cava received a large branch which arched over the root of the left lung, and received the veins from the five upper intercostal spaces. This branch communicated below with a third azygos vein, which in its turn communicated below with the vena azygos minor. As pointed out by Mr. Marshall, this branch is a left azygos, and is formed by the persistence of a part of the left cardinal vein. It measured one-eighth of an inch in diameter. The right azygos or azygos major measured three-sixteenths of an inch in diameter and had normal relations.

The transverse branch that has already been mentioned as stretching between the two venæ cavæ measured about two and a half inches in length. It came off obliquely from the inner side of the left vena cava, and running slightly forwards and downwards across the roots of the three great branches of the aortic arch, terminated also in an oblique manner in the right cava. At its origin from the left cava it measured a quarter of an inch in circumference, but shrunk until, half an inch farther down, it only admitted a coarse bristle. About the middle of its course it received a large thyroid vein measuring one-eighth of an inch in diameter, and from this point to its termination in the right cava its diameter increased to a little over an eighth of an inch. There were no valves at either of the openings into the right and left cavæ. The entrance of the inferior thyroid into the transverse branch was guarded by two valves.

Within the pericardium the persistent vena cava, as it wound below the left lower pulmonary vein, received the great coronary vein, which was guarded by two valves, and farther on, about half an inch before it terminated in the right auricle, it received the posterior cardiac vein. There was a well-marked Eustachian valve at the orifice of the inferior vena cava. This valve, as is frequently the case, was cribriform. The foramen ovale was

perfectly closed, as was also the ductus arteriosus. The rest of the heart was normal.

The right innominate vein measured one inch and a half in length, and received in addition to the internal jugular and subclavian veins the right inferior thyroid veins. The right internal mammary, as is often the case, terminated in the vena cava just after its commencement; the right vertebral and the right deep cervical vein terminated in the subclavian. The right vena cava measured three inches in length, and received, in addition to the internal mammary, the right innominate and the transverse branch from the left cava, the vena azygos major. The right cava was slightly constricted on its entrance into the auricle. There were four pulmonary veins, two on each side; the other vessels were normal.

This specimen is of interest, not because it throws any new light upon the development of the great anterior veins, so admirably worked out by Mr. Marshall, but rather because it is perhaps the most perfect specimen of this rare persistence of the left venous trunk in the adult that has as yet been recorded. Of the thirty-one cases of double vena cava collected by Mr. Marshall, the descriptions of the majority are incomplete, especially as to the presence of a cross branch in the neck and as to the condition of the azygos veins. Only eleven examples occurred in adults; "in two instances only is the cross branch placed beyond a doubt," and the condition of the azygos veins is accurately known in only four cases.

Since the publication of Mr. Marshall's paper several examples of persistence in a greater or less degree of the left duct of Cuvier and the left primitive and jugular veins have been from time to time published. Thus Grüber[1] has described an S-shaped vein uniting the coronary sinus to the superior intercostal vein, and a vena hema-azygos opening into the coronary sinus instead of into the vena azygos major. Dr. Greenfield showed at the Pathological Society during the session of 1876 a unique specimen, in which not only was the left duct of Cuvier persistent, but the right had been suppressed.

The dilated condition of the intra-pericardial portion of the persistent left cava seems also of interest. The same striking dilatation appears to have existed in all the examples of persistent cavæ that have been recorded, but I have not met with any explanation of it. At first sight it would appear that the increase in size of this portion of the vessel was simply due to its being joined by the great coronary vein. That it is in some measure due to this cause is evident. But the increase in area is greater

[1] Archiv. für path. Anat., Virchow, B. 2, 1865; and Archiv. für Anat. Physiol., &c., Reichert, 1864.

than the combined area of the two veins together, proving conclusively that the dilatation is in part due to another cause. Rather it seems to me that the intra-pericardial portion has yielded to the backward pressure of the blood during the contraction of the auricle. Such a yielding would not seem improbable when we remember that this part of the vein consists of what is usually the coronary sinus; and the coronary sinus being provided with a valve, is not called upon to resist the backward pressure of blood during the auricular systole, and has consequently thinner walls than the intra-pericardial portion of the right vena cava. The absence of the Thebesian valve in this specimen, in connection with the thinner walls of the intra-pericardial portion of the vein, would therefore seem to account for the dilatation. The absence of this valve may be explained on the supposition that the increase in the size of the orifice of the left cava (following upon the large amount of blood it had to transmit) by stretching the valve had rendered it useless, and that it had consequently shrunk into the slight fold of lining membrane occupying the posterior and inner margin of the orifice.

The Common Iliac Veins running on each side of the Aorta as high as the Renal before uniting to form the Inferior Vena Cava.

The left common iliac vein, instead of crossing under the right common iliac artery and joining the right common iliac vein to form the inferior vena cava, ran behind the left common iliac artery and then proceeded along the left side of the abdominal aorta as far as the left renal vein, which it joined at a right angle; then turning almost transversely to the right, it crossed the front of the aorta and joined the right common iliac vein. The latter vein ran up on the right side of the aorta and terminated, after joining the left vein as above described, in a short inferior vena cava. The left common iliac vein, a little to the left of the corresponding artery, was joined by a large branch which ran obliquely across the first piece of the sacrum and the fifth and fourth lumbar vertebræ. This branch began in the right internal iliac vein half an inch from the junction of the latter with the right external iliac vein. It received in its course the right lateral sacral vein, the middle sacral vein, and a small transverse branch which crossed under the right common iliac artery and joined the right common iliac vein. The left spermatic vein terminated at the angle of junction of the left common iliac vein with the renal of the same side. The left capsular vein opened

into the trunk formed by the junction of the renal and left common iliac. The right renal joined the inferior vena cava at the confluence of the right common iliac with the conjoined left common iliac and renal veins. There were two spermatic veins on the right side; one joined the right common iliac an inch

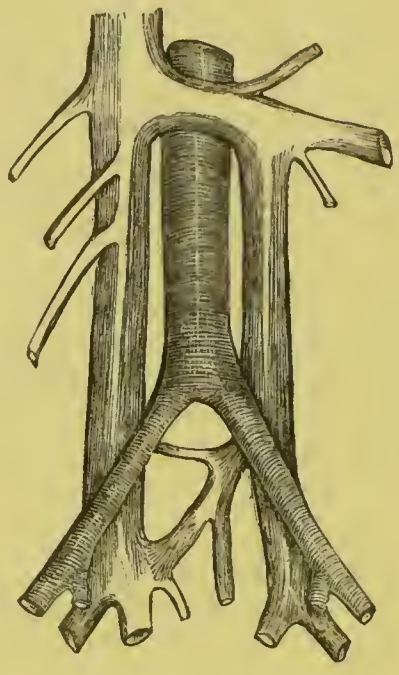

Fig. 9.

below the inferior vena cava, the other opened into the vena cava at the angle of union of the right common iliac with the united left common iliac and renal veins.

I am not aware that any explanation has been offered of this abnormality. One would surmise, however, that it was capable of an explanation similar to that given for the left persistent vena cava superior, viz., that in early fœtal life the vein is normally double, and that the left is usually suppressed—a view which at first sight seems supported by the fact that the vena cava inferior has been seen to run up on the right of the aorta in a subject in which there was no transposition of the viscera.[1] This, however, is not in accordance with the present teaching of embryologists. It may be that the presence of the two veins is simply due to the right and left common iliac veins having failed to unite in the usual situation, although this does not explain the occasional existence of the inferior vena cava on the right side of the aorta in cases of non-transposition of the viscera.

[1] St. Thomas' Hospital Reports, vol. vi.

A Double Left Renal Vein.

The left renal vein, after receiving the left capsular vein as usual, divided into two branches, one of which, the larger, crossed in front, the other and smaller behind the aorta. They opened by two distinct orifices into the vena cava, one anteriorly to the other. The posterior branch received the spermatic and

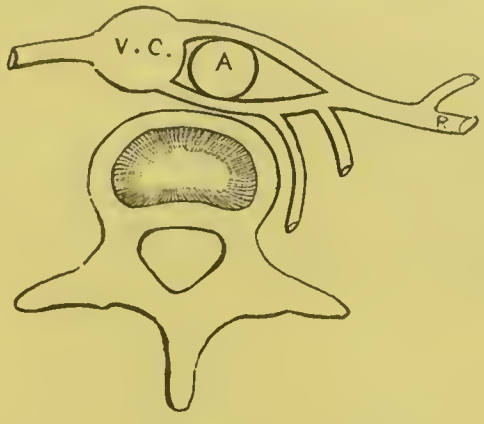

Fig. 10.[1]

also the third left lumbar vein. The renal vein has been seen running behind the aorta, but, as far as I know, not embracing it, as in this instance. Small ramifications generally run between the renal and the lumbar veins, and the branch of the renal running behind the aorta might be regarded as consisting in part of a large third lumbar vein, and in part as an enlargement of the ramification which runs between the lumbar vein and the renal. Against this view is the fact of the spermatic vein opening into the posterior branch of the abnormal vein.

Lymphatics.

The Thoracic Duct ending on the right side in the Confluence of the Internal Jugular and Subclavian Veins.

The duct began at the receptaculum chyli, and ran through the posterior mediastinum between the vena azygos major and the aorta in the normal manner; but instead of passing behind the œsophagus and aorta to the left side as usual, it continued its course upwards on the right side between the œsophagus and the vertebral column, and after crossing in front of the right subclavian artery, which in this subject was derived from the

[1] (Fig. 10.) V. C. = Vena Cava; A = Aorta; R = Renal Vein.

third part of the arch of the aorta, terminated at the confluence of the right internal jugular and subclavian veins.

A similar instance has been recorded by Dr. Watson.[1] Dr. Allen Thomson has also seen the duct ending on the right side, but in his case there was a right aortic arch.

In birds there are two thoracic ducts, running side by side, and opening directly into the jugular vein. In the kangaroo, the dog, and the sea-otter there are two thoracic ducts. They begin in the thorax at the receptaculum chyli, which in these animals passes through the diaphragm, and run up on each side of the dorsal vertebræ as high as the seventh, where the right duct crosses and joins the left, and thence, after forming a slight plexus, terminates at the confluence of the left jugular and subclavian veins. In the ox the duct usually bifurcates, the two divisions diverging to the right and left innominate veins formed by the jugulars and axillaries.

Nerves.

The Buccal Branch given off from the Superior Maxillary Division of the Fifth Nerve.

This branch was given off from the superior maxillary trunk as it crossed the spheno-maxillary fossa, just beyond the origin of the ganglionic branches. It ran along the anterior border of the tendon of the temporal muscle, with a small twig from the alveolar branch of the internal maxillary artery, and entered the buccinator muscle at the usual situation. This abnormality is of considerable interest, as it furnishes an additional argument in favour of the purely sensitive function of the buccal branch of the fifth. A similar distribution has twice been recorded by Professor Turner,[2] and in two instances a large nerve coming from the superior maxillary through the spheno-maxillary fissure from the orbit into the pterygoid space has been noticed at Guy's Hospital.[3] The nerve had been cut in both instances, and the other branches in its neighbourhood destroyed, before it was noticed. It was thought to be probably an abnormal buccal.

Abnormal Course of the Phrenic Nerve.

The nerve arose from the third, fourth, and fifth cervical cords as usual, but ran along the outer edge of the scalenus anticus,

[1] Journal of Anatomy and Physiology, vol. vi. p. 427.
[2] Ibid., November 1866, p. 33.
[3] Guy's Hospital Reports, vol. xiv. p. 452.

instead of crossing this muscle obliquely from without inwards. After passing under the transversalis colli and the supra-scapular arteries and the transversalis colli vein, it turned over the supra-scapular vein at the spot where this latter vein joins the external jugular, and then passed under the junction of the internal jugular and subclavian veins almost transversely across the scalenus anticus, and after crossing the root of the internal mammary artery, proceeded in the normal manner through the thorax to the diaphragm. In a second instance the phrenic nerve was also noticed running along the outer border

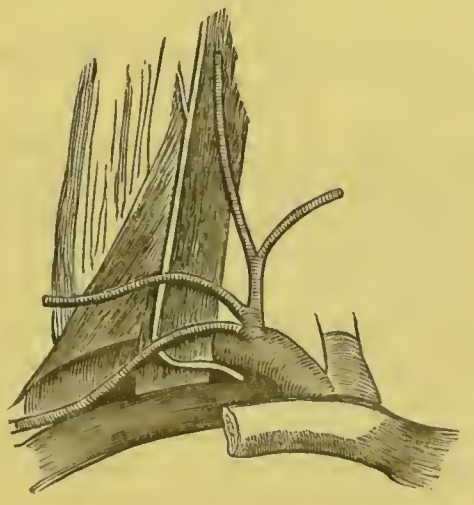

Fig. 11.

of the scalenus anticus, but in this case it wound round the loop formed by the junction of the internal jugular and subclavian veins. It appeared to be held in this abnormal situation by the branch which it received from the nerve to the subclavius. The latter nerve was of large size and in a state of tension. The supra-scapular and transversalis colli arteries, and the transversalis colli vein crossed under the nerve, instead of over it as usual.

The fact that the phrenic nerve may occasionally run along the outer edge of the scalenus anticus, instead of obliquely across it, is of importance with reference to ligature of the subclavian artery in the third part of its course, and is suggestive of the desirability of avoiding the anterior surface of the muscle in performing that operation.

The Phrenic Nerve crossing in front of the Left Innominate Vein.

The nerve, the origin of which was normal, after crossing in front of the transversalis colli and supra-scapular arteries, passed in front instead of behind the left innominate vein. Where it crossed the vein it was joined by the branch from the nerve to the subclavius.

Viscera.

Abnormal Peritoneal Attachments of the Small and Large Intestines.

The following peculiar arrangement of the peritoneum occurred in the body of a well-developed adult female subject.

The stomach and its peritoneal connections were normal. The mesentery, at its posterior or attached border, extended obliquely across the spine from the left side of the second lumbar vertebra to the bifurcation of the right common iliac artery, and included in its free or intestinal border not only the jejunum and ileum, but also the cæcum and three inches of the ascending colon. The cæcum lay in the left iliac fossa, but could be moved freely into the right and into the pelvis. The ascending colon ran first from *left to right* in a gentle curve, with its concavity upwards, across the lower part of the umbilical region to the lower end of the attached border of the mesentery at the bifurcation of the right common iliac artery, and then turned upwards, still continuing in the umbilical region. The colon, from the bifurcation of the right common iliac artery to the hepatic flexure, was attached to the right side of the bodies of the lower lumbar vertebræ by a short ascending meso-colon continuous with the lower end of the mesentery, so leaving to the right of the ascending colon a peritoneal fossa measuring four inches transversely. In other words, the peritoneum was continued from the lateral walls of the abdomen over the quadratus lumborum, the psoas, and the descending portion of the duodenum to the right side of the lumbar vertebræ over the colon back to the spine, then was reflected over the small intestines forming the mesentery, and thence proceeded in the usual manner over the descending colon to the abdominal walls. The descending portion of the duodenum lay two inches to the right of the ascending colon, bulging slightly over the outer edge of the quadratus lumborum. Coils of small intestine were found occupying the fossa, which lay, as previously mentioned, to the right of the ascending colon, and

into which also the lower part of the sigmoid flexure could be placed. From the hepatic flexure the colon turned to the left to form the transverse part of the arch, and then downwards in the usual manner to form the descending colon. On a level with the crest of the left ilium a reflexion of peritoneum containing the sigmoid flexure in its free margin extended transversely across the spine at the level of the fifth lumbar vertebra to the right iliac fossa, where the sigmoid flexure became the rectum. The rectum descended into the pelvis from *right to left*, and was attached to the back of the pelvis by a short mesorectum. The sigmoid flexure measured thirty-five inches in

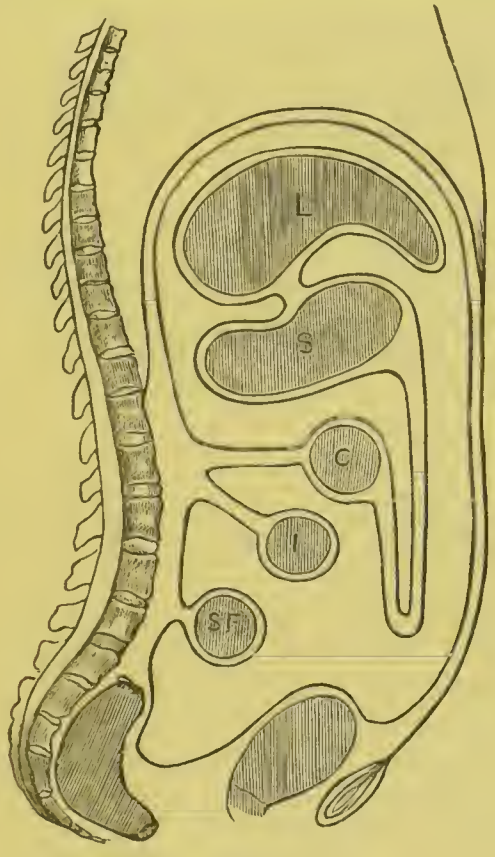

Fig. 12.[1]

length. The peritoneal fold attaching it to the back of the abdominal cavity allowed this part of the bowel to be moved as high as the right kidney.

This description of the reflexion of the peritoneum will perhaps be better followed by the aid of the accompanying diagrams.

[1] (Fig. 12.) L = Liver; S = Stomach; C = Colon; I = Small intestines; S F = Sigmoid flexure.

There was no appearance of adhesions or of other signs of former peritonitis; indeed, the great length of the sigmoid flexure alone points to the abnormality being one of congenital origin. This is the first instance of the kind that I have met with, and I am not aware that such a one has been described. Dr. Shepherd of Montreal, however, has seen the descending colon cross the spinal column from left to right about the level of the fourth lumbar vertebra, whence it descended to the right sacro-iliac synchondrosis and formed the rectum, which passed into the pelvis from

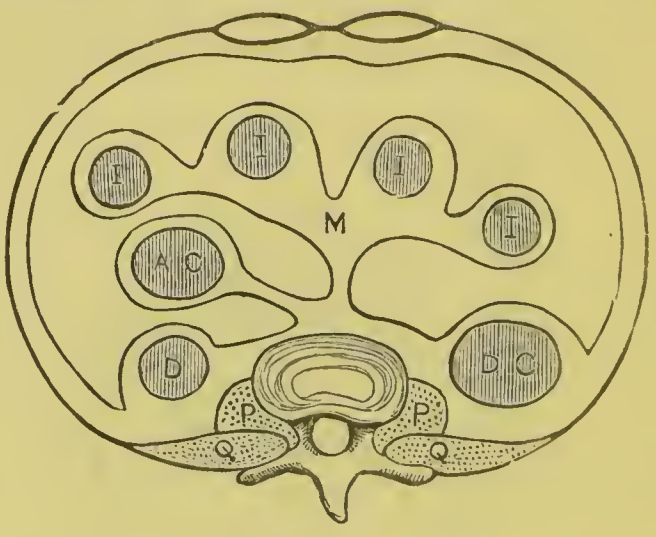

Fig. 13.[1]

right to left. The descending colon was covered in front only by peritoneum, by which it was bound tightly down to the abdominal aorta.

From a surgical point of view the abnormality is interesting in several respects. The only portion of intestine in the right lumbar region uncovered by peritoneum was a part of the descending duodenum, which lay a little to the right of the quadratus lumborum, the ascending colon being altogether to the left of that muscle, and completely surrounded by the serous membrane. Should colotomy have been called for, the duodenum would have run the risk of being opened; but such a risk, this arrangement being so rare, may be thought remote. The duodenum, however, frequently projects, as in this case, to the right of the quadratus lumborum, and the ascending colon is as frequently completely surrounded with peritoneum; a point that does not seem to have attracted the notice which it appears to me to deserve.

[1] (Fig. 13.) I = Small intestines; A C = Ascending colon; D C = Descending colon; D = Duodenum; M = Mesentery; P = Psoas; Q = Quadratus Lumborum.

The fact that the ascending colon is often surrounded with peritoneum is, of course, well recognised; but the more important fact that the only portion of the intestine uncovered by peritoneum in the lumbar region may be the duodenum does not seem to be so generally known. The recognition of such a condition of the parts is certainly attended with difficulty in the performance of colotomy on the dead body; and to show that the risk of opening the duodenum in mistake for the colon in the performance of the operation on the living is not altogether chimerical, I may state that such an accident, to my own personal knowledge, has occurred to a surgeon with much experience in this operation.

Such an occasional course and attachments of the sigmoid flexure and rectum are suggestive of caution in attempts to pass the whole hand through them from the anus for the purpose of exploring the pelvis of the kidney for stone.

A Septed Uterus and Double Vagina.

The uterus was, to outward appearance, single, but was divided internally by a longitudinal median septum into two cavities, each of which was connected with the corresponding Fallopian tube. The septum extended through the cervical portion of the uterus into the vagina almost as far as the pudenda. The right cavity of the uterus and right vagina were slightly larger than the left. The right os was round and slightly puckered, like that of a uterus that has been impregnated; the left had the characters of the os of a virgin uterus. Externally the vagina presented a longitudinal median groove along its upper and lower walls, indicating the situation of the septum within.

The abnormality, which belongs to the class called by Kussmaul "Uterus septus cum vaginâ duplici," seems to depend upon a defective development in the Müllerian ducts about the second month of intra-uterine life. The contiguous and already blended walls of the ducts, instead of becoming absorbed, and so giving rise to a single uterine cavity and vagina, remained, and became developed into a septum of considerable thickness. The parts were taken from the body of a middle-aged female subject, of whom no history could be obtained.